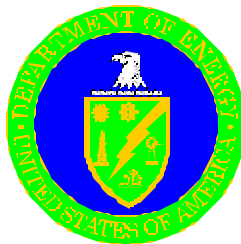




HIGH ENERGY PHYSICS PROGRAM

High Energy Physics Advisory Panel



Dr. John R. O'Fallon

Director, Division of High Energy Physics

U.S. Department of Energy

August 5, 2002



Recent Appropriations History (B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>
Congressional Budget Request	\$ 714.7	\$ 716.1	\$ 725.0
House Appropriations Bill	714.7	716.1	725.0
General Reduction (HEP share)	<u>- 3.5</u>	<u>- 0.5</u>	<u>-5.6</u>
Net	\$ 711.2	\$ 715.6	\$ 719.4
Senate Appropriations Bill	\$ 677.0	\$ 725.1	\$ 730.0
General Reduction (HEP Share)	<u>-12.3</u>	<u>--</u>	<u>-3.4*</u>
Net	\$ 664.7	\$ 725.1	\$ 726.6
Conference Committee	726.1	716.1	
General Reduction (HEP Share)	-8.7	-2.9	
Safeguards and Security Transfer	<u>-6.2</u>	<u>--</u>	
	\$ 711.2	\$ 713.2	
Appropriation after reductions	711.2	713.2	
SBIR & STTR	<u>-15.3</u>	<u>-15.2</u>	
Net Funding Available	\$ 695.9	\$ 698.0	

*Estimated



Recent Budget Highlights

- The **House Committee on Appropriations July 10, 2002** press release outlined the Chairman's mark for the FY 2003 Energy and Water Development Appropriations:
 - \$20.7B for DOE--\$147M over the President's request and \$806M above FY 2002
 - DOE science programs funded at \$3.27B--\$8M less than the budget request and \$38M above FY 2002
 - **High Energy Physics funded at \$724.9M--at the request level and an increase of \$8.9M over FY 2002 (before FY 2002 General Reduction)**
- **House Energy and Water Development Appropriations Draft Committee Report (July, 2002):**
 - “The Committee recommends \$724,990,000 for high energy physics, the same as the budget request and \$8,890,000 more than fiscal year 2002. The previous subaccounts within the High Energy Physics account—research and technology and facility operations—are consolidated into a single account for fiscal year 2003, with the control level at the High Energy Physics level. The Committee is concerned about the difficulties being experienced with the luminosity upgrade of the Tevatron and with the Neutrinos at the Main Injector, both projects at Fermi National Accelerator Laboratory. The committee expects the Department and the laboratory to exercise aggressive project management to bring these projects back on schedule, and to do so within the funds available for High Energy Physics. The Committee encourages the Department to work with the Office of Management and Budget to remove the existing limit on funding that may be spent for planning and research and development in support of the Next Linear Collider.”



Recent Budget Highlights (cont'd)

- **House Energy and Water Development Appropriations Draft Committee Report (July, 2002)** also included the following:
 - Expressed concern about imbalance between physical sciences and life sciences.
 - Expressed hopes for an FY 2004 budget that will support “a robust physical sciences research program.”
 - Stated it will support growth in the Science budget ... possible new projects ... **IF**
 - DOE “is able to present a rational scheme for setting priorities among the various research areas and among the wide range of possible new projects (e.g., Next Linear Collider, Rare Isotope Accelerator, etc.)”
 - DOE “can improve its program and project management”
 - DOE takes “tangible and aggressive steps to implement external regulation at its Science laboratories

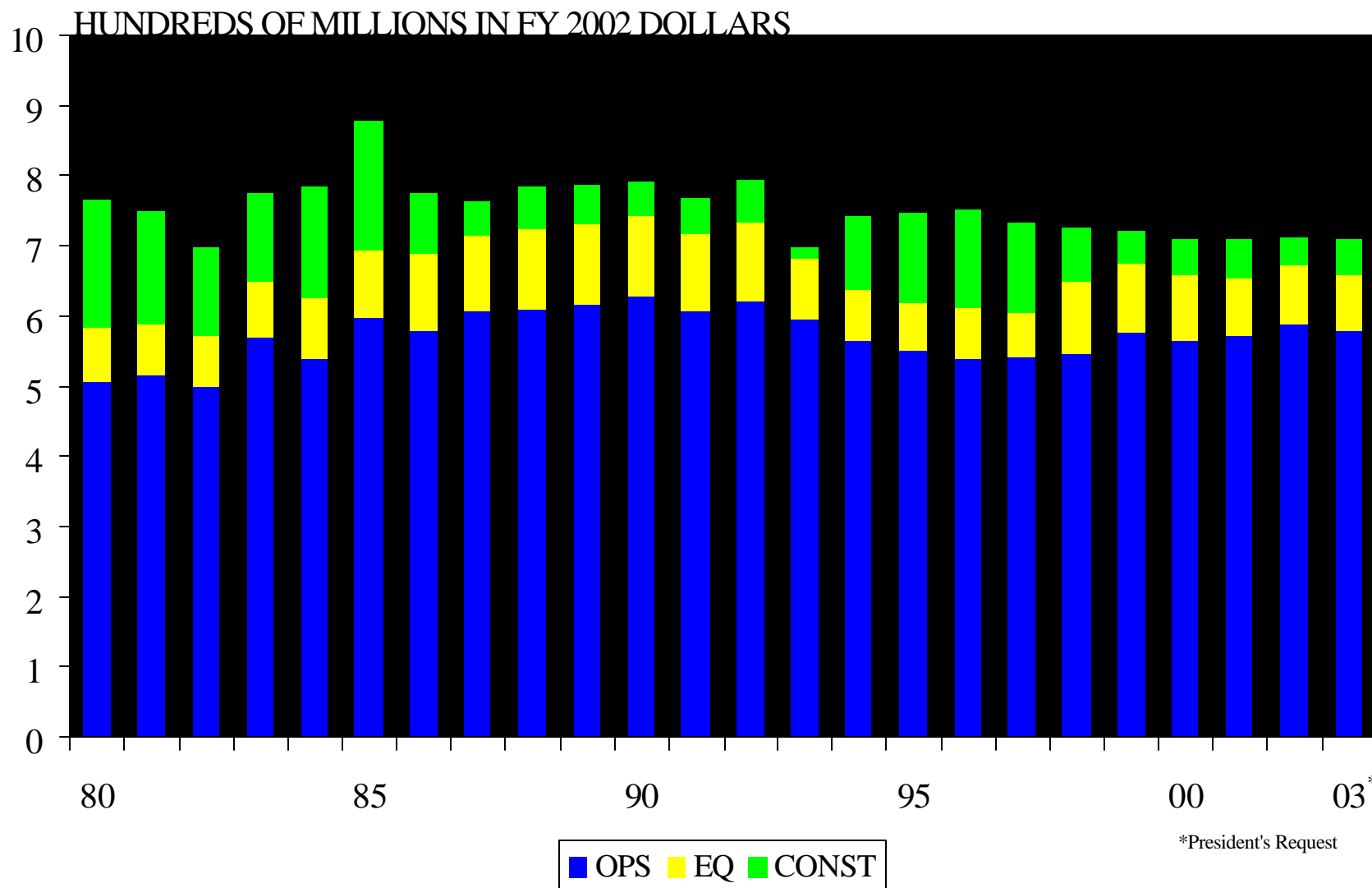


Recent Budget Highlights (cont'd)

- **Senate Draft Committee Report (July 24, 2002):**
 - Recommended \$730.0M for high energy physics
 - Included an additional \$5M for Research and Technology at SLAC
 - Recognized HEPAP recommendation that the “Next Linear Collider (NLC) at the Stanford Linear Accelerator Center should proceed into design and construction.”
 - Recognized overall decline (roughly half) in DOE’s R&D since 1970
 - Recognized 22% decline in the number of Ph.D.’s in physics in the U.S. between 1994 and 2000
 - Recognized the shrinking investment in the physical sciences and engineering and the risk it poses to DOE’s ability to perform its mission, and its impact on the nation’s science and technology enterprise.



High Energy Physics Funding





FY 2003 Budget (Old Budget and Reporting Structure)

(B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003 Request</u>
Research & Technology			
Physics Research	\$ 163.8	\$ 159.3	\$ 166.1
Technology R&D	<u>76.9</u>	<u>84.9</u>	<u>92.4</u>
Subtotal	\$ 240.7	\$ 244.2	\$ 258.5
Facility Operations			
Operating	\$ 317.4	\$ 328.6	\$ 307.2
Capital Equipment (not including LHC)	40.8	50.3	47.8
AIP	11.1	17.7	18.8
GPP	10.0	12.0	12.5
LHC	<u>58.9</u>	<u>49.0</u>	<u>60.0</u>
Subtotal	\$ 438.2	\$ 457.6	\$ 446.4
Construction			
Neutrinos at the Main Injector - NuMI (TEC \$ 109.2)	\$ 22.9	\$ 11.4	\$ 20.1
Wilson Hall (TEC \$15.6)	4.2	--	--
SLAC Research Office Bldg. (TEC \$7.2)	<u>5.2</u>	<u>--</u>	<u>--</u>
Total Construction	\$ 32.3	\$ 11.4	\$ 20.1
Total HEP Budget	\$ 711.2	\$ 713.2	\$ 725.0
 SBIR & STTR	 <u>-15.3</u>	 <u>-15.3</u>	 <u>-15.6</u>
	\$ 696.9	\$ 697.9	\$ 709.4



FY 2003 Budget (New Budget and Reporting Structure) ***(B/A in Millions)***

	<u>FY 2002</u>	<u>FY 2003 Request</u>
Proton Accelerator-based Physics		
Research	\$ 71.3	\$ 74.4
Facilities	262.6	246.8
LHC	49.0	60.0
LHC Support	<u>5.4</u>	<u>6.7</u>
Subtotal	\$ 388.3	\$ 387.9
Electron Accelerator-based Physics		
Research	\$ 29.7	\$ 33.1
Facilities	<u>117.8</u>	<u>117.0</u>
Subtotal	\$ 147.5	\$ 150.1
Non-Accelerator-based Physics/Research	\$ 39.2	\$ 37.4
Theoretical Physics/Research	\$ 42.0	\$ 42.5
Advanced Technology R&D/Research	\$ 84.7	\$ 87.0
Construction/NuMI	\$ 11.4	\$ 20.1
Total HEP Budget	\$ 713.1	\$ 725.0
SBIR & STTR	<u>\$ - 15.4</u>	<u>\$ - 15.6</u>
	\$ 697.7	\$ 709.4



Appendix



High Energy Physics New Budget & Reporting Structure

Proton Accelerator-based Physics Subprogram

Research

University Research

National Laboratory Research

*University Service Accounts (formerly
Laboratory Service Accounts)*

Other

Facilities

Tevatron Complex Operations

Accelerator Operations

Detector Operations

Inventories

Tevatron Complex Support

Accelerator Support

Detector Support

Other Tevatron Support Costs

Technology R&D Supporting Projects

Accelerator R&D

Detector R&D

Large Hadron Collider Project

LHC Accelerator

LHC Procurements from Industry

ATLAS Detector

CMS Detector

LHC Support

LHC Software and Computing

LHC Experimental Support

LHC Accelerator R&D

AGS Operations

AGS Support

Other Facility Activities



High Energy Physics New Budget & Reporting Structure *(cont'd)*

Electron Accelerator-based Physics Subprogram

Research

University Research
National Laboratory Research
University Service Accounts
Other

Facilities

Electron Accelerator Complex Operations
 Accelerator Operations
 Detector Operations
 Inventories
Electron Accelerator Complex Support
 Accelerator Support
 Detector Support
 Other Facility Support Costs
Technology R&D Supporting Projects
 Accelerator R&D
 Detector R&D
Other Facility Activities

Non-Accelerator-based Physics Subprogram

Research

University Research
National Laboratory Research
Projects
Other

Theoretical Physics Subprogram

Research

University Research
National Laboratory Research
SciDAC
Other



High Energy Physics New Budget & Reporting Structure *(cont'd)*

Advanced Technology R&D Subprogram

Accelerator Science

University Research

National Lab Research

Other

Accelerator Development

General Accelerator Development

Linear Collider

Muon Accelerators

Other Technology R&D

Advanced Detector Research

Detector Development

Conceptual Design Reports

Other

Construction

NuMI



PHYSICS RESEARCH UNIVERSITY PROGRAM



Physics Research University Program

OHENP
S. P. Rosen

EPO
K. Turner

DHEP
J. R. O'Fallon

**Internat'l
Agreements**
Russia -- PKW
China -- JEM
Japan -- JLS

OJI
J. Mandula

ADR
M. Procario

Physics Research
P. K. Williams
S. Pepper, Secy.

SAGENAP
J. Stone

**Theoretical
Physics**

J. Mandula
P. K. Williams

**Experimental Physics
at Accelerators**
M. Procario
K. Turner
J. Stone
(IPA - Vacant)

**Astro/Cosmo.
Experiments**

J. Stone (Ground)
K. Turner (Space)



Physics Research University Program Recent Funding Levels

\$ in Millions

<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>
\$ 102.2	\$ 107.6	\$ 109.0	\$ 103.9	\$ 106.4

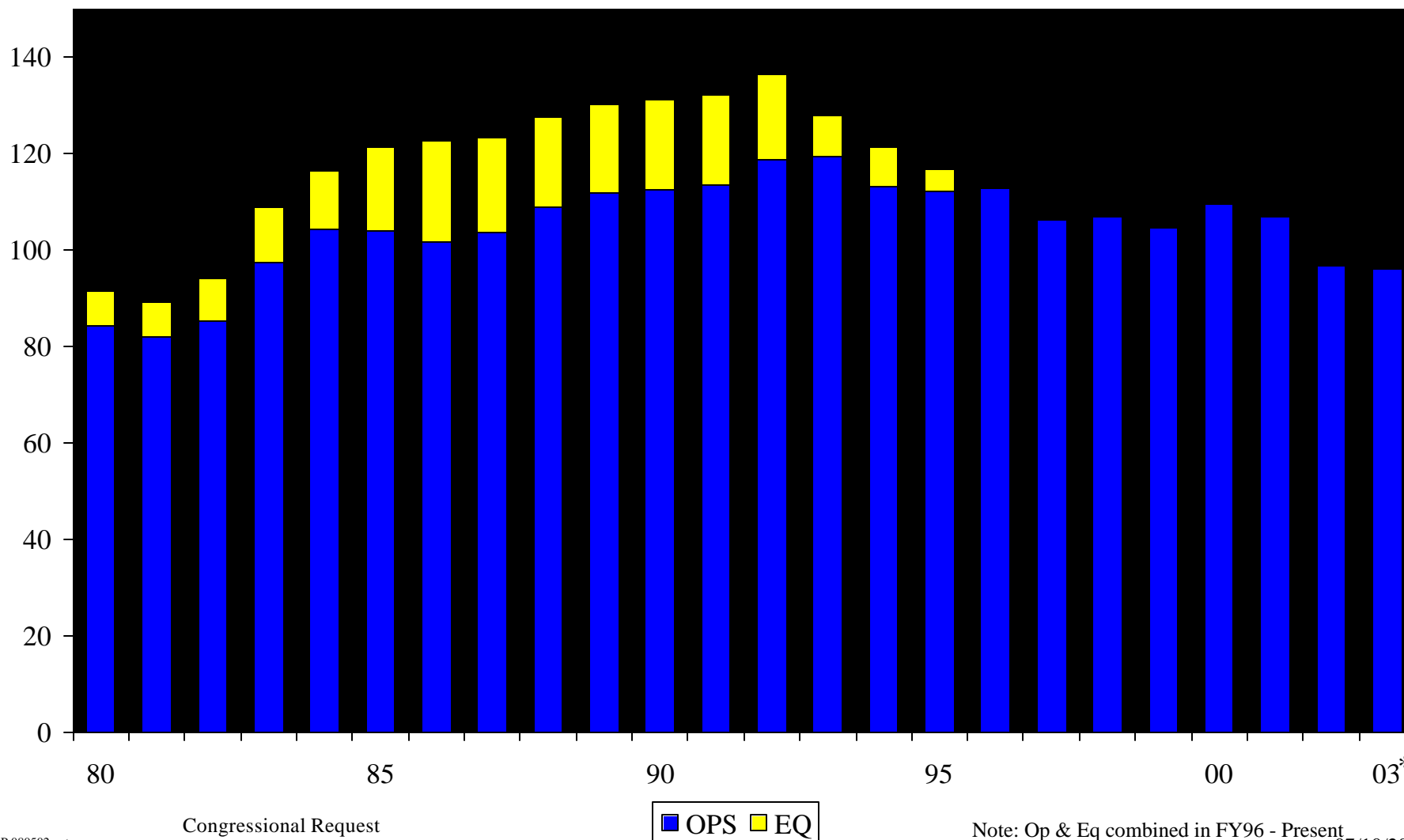
102 Universities (75 E, 68 T, 32 N)
236 Groups (127 E, 73 T, 36 N)

E = Experimental (Accelerator Related) T = Theoretical N = Non-Accelerator Related



Physics Research University Program Funding

MILLIONS OF FY 2002 DOLLARS



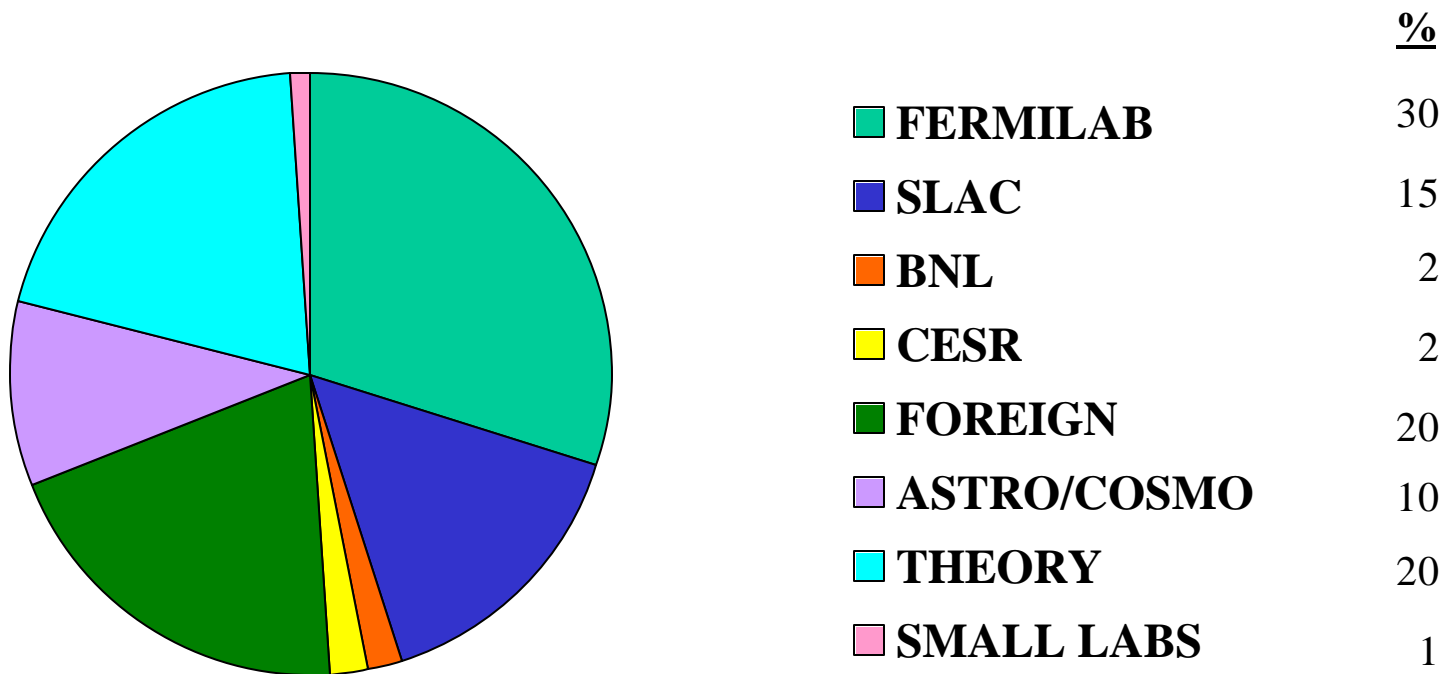


FY 2001 DOE-Funded FTE's in HEP University Program (% Change since FY 1992)

Program	# faculty	# postdocs/research scientists	# graduate students	TOTAL
Theory	225 (-17%)	110 (-16%)	116 (-37%)	451
Experiment Accelerator Based	284 (-3%)	332 (+28%)	312 (-26%)	928
Experiment Not Accelerator based	35 (-8%)	36 (-14%)	35 (-24%)	106
TOTAL	544 (-10%)	478 (+10%)	463 (-30%)	1485 (-12%)



Physics Research University Program Funding Distribution





Non-Accelerator-based Astrophysics and Cosmology Experiments

Recent Developments:

- Many interdisciplinary approaches to issues in particle physics, astrophysics, and cosmology emerging.
- Trend towards larger-scale efforts from underground/ice/sea to ground level, to space.
- National Laboratories involved in many projects – scientific personnel, technical expertise, engineering, and project management.
- Interagency cooperation increasing.

General Topics:

- Neutrino Oscillations—Atmospheric, Solar, Reactor
 - Examples: SuperK, SNO, KamLAND
- Neutrino-less Double Beta Decay
 - Example: EXO
- Dark Energy from Distant Supernova studies
 - Examples: SNAP, Nearby Supernovae Factory
- Dark Matter Searchers (WIMPs, Axions, Highest Energy Cosmic Rays, EAS, Air Fluorescence)
 - Examples: CDMS, AXION, Auger, AMS
- High Energy Gamma Rays, Gamma Bursters
 - Examples: Granite Telescope, VERITAS, GLAST
- UHE Neutrinos
 - Example: SuperK